UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/070,549	03/07/2002	Atsushi Sumasu	L9289.02141	4647

24257 7590 05/22/2007
STEVENS DAVIS MILLER & MOSHER, LLP
1615 L STREET, NW
SUITE 850
WASHINGTON, DC 20036

EXAMINER	
TORRES, JUAN A	

ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
05/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/070,549	SUMASU ET AL.	
	Examiner	Art Unit	
	Juan A. Torres	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-15,17-44 and 50-63* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-14,17-44,50-55 and 57-63* is/are rejected.

7)☒ Claim(s) *15 and 56* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 April 2007* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The modifications to the drawings were received on 04/30/2007. These modifications are accepted by the Examiner.

The drawings are objected to because:

a) The recitation in figure 5 "PRE-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "PRE-CONVERSION OFDM SYMBOL PATTERN" (emphasis added).

b) The recitation in figure 5 "POST-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "POST-CONVERSION OFDM SYMBOL PATTERN".

c) The recitation in figure 7 "PRE-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "PRE-CONVERSION OFDM SYMBOL PATTERN".

d) The recitation in figure 7 "POST-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "POST-CONVERSION OFDM SYMBOL PATTERN".

e) The recitation in figure 13 "PRE-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "PRE-CONVERSION OFDM SYMBOL PATTERN".

f) The recitation in figure 13 "POST-COMVERSION OFDM SYMBOL PTTERN" is improper because it is not properly constructed; it is suggested to be changed to "POST-CONVERSION OFDM SYMBOL PATTERN".

g) The recitation in figure 14 "PRE-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "PRE-CONVERSION OFDM SYMBOL PATTERN".

h) The recitation in figure 14 "POST-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "POST-CONVERSION OFDM SYMBOL PATTERN".

i) The recitation in figure 16 "PRE-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "PRE-CONVERSION OFDM SYMBOL PATTERN".

j) The recitation in figure 16 "POST-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "POST-CONVERSION OFDM SYMBOL PATTERN".

k) The recitation in figure 18 "PRE-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "PRE-CONVERSION OFDM SYMBOL PATTERN".

l) The recitation in figure 18 "POST-COMVERSION OFDM SYMBOL PATTERN" is improper because it is not properly constructed; it is suggested to be changed to "POST-CONVERSION OFDM SYMBOL PATTERN".

m) In figure 29B seems to be improper representation of the invention because the number of patterns after the first signal didn't increase; it seems that the (0,0) point should be a constellation point (see figure 30B) (emphasis added).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The modifications to the specification were received on 04/30/2007. These modifications are accepted by the Examiner.

In view of the amendment filed on 04/30/2007, the Examiner withdraws Specification objections of the previous Office action.

Claim Objections

The modifications to the claims were received on 04/30/2007. These modifications are accepted by the Examiner.

Claims 63 and 50-56 are objected to because of the following informalities:

Regarding claim 63, the recitation in line 8 "symbol; and" (emphasis added) of clam 63 is improper, because doesn't properly claim the limitations of the claims (see claims 57-62 for example); it is suggested to be changed to "symbol;".

Regarding claims 50-56, they are objected because they depend directly from claim 63, and claim 63 is objected.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The modifications to the claims were received on 04/30/2007. These modifications are accepted by the Examiner.

In view of the amendment filed on 04/30/2007, the Examiner withdraws claims rejections under 35 USC § 112 second paragraph to claims 2-7,17-20, 41, 42 and 44 of the previous Office action.

Response to Arguments

Applicant's arguments with respect to claims 57-63 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 57-63, 2-5, 8-14, 17-28, 30 and 50-55 are rejected under 35 U.S.C. 102(b) as being anticipated by Sumasu ("method to reduce the peak power with signal space expansion (ESPAR) for OFDM system". 2000 IEEE 51st Vehicular Technology Conference Proceedings, 2000, VTC 2000-Spring Tokyo, Volume 1, 15-18 May 2000 Page(s): 405 - 409 vol.1).

Regarding claim 57, Sumasu discloses a receiving section that receives a multi-carrier signal in which transmission data is mapped to subcarriers with a first symbol string at a communicating party, the first symbol string being selected from symbol patterns that include a first symbol with an amplitude of at least one of an in-phase component and a quadrature component set to "0" and have a greater number of patterns than symbol patterns that do not include the first symbol (section II pages 405-407, figures 2 and 5b. The BPSK signal disclosed by Sumasu is one of an in-phase and a quadrature component signal); and a demapping and demodulating section that demaps the multi-carrier signal received at the receiving section, demodulates demapped symbol patterns, and obtains reception data (section II pages 405-407, figures 2 and 5b);

Regarding claim 58, Sumasu discloses a mapping and modulating section that maps transmission data to subcarriers with a first symbol string, the first symbol string being selected from symbol patterns that include a first symbol with an amplitude of at least one of an in-phase component and a quadrature component set to "0" and have a

greater number of patterns than symbol patterns that do not include the first symbol (section II pages 405-407, figures 2 and 5a. The BPSK signal disclosed by Sumasu is one of an in-phase and a quadrature component signal); and a transmitting section that transmits mapped multi-carrier signals (section II pages 405-407, figures 2 and 5a).

Regarding claim 59, Sumasu discloses a receiving section that receives a multi-carrier signal in which transmission data is mapped to subcarriers with a first symbol string at a communicating party, the first symbol string being selected from symbol patterns that include a first symbol with an amplitude of at least one of an in-phase component and a quadrature component set to "0" and have a greater number of patterns than symbol patterns that do not include the first symbol (section II pages 405-407, figures 2 and 5b. The BPSK signal disclosed by Sumasu is one of an in-phase and a quadrature component signal); and a demapping and demodulating section that demaps the multi-carrier signal received at the receiving section, demodulates demapped symbol patterns and obtains reception data (section II pages 405-407, figures 2 and 5b);

Regarding claim 60, Sumasu discloses a receiving section that receives a multi-carrier signal in which transmission data is mapped to subcarriers with a first symbol string at a communicating party, the first symbol string being selected from symbol patterns that include a first symbol with an amplitude of at least one of an in-phase component and a quadrature component set to "0" and have a greater number of patterns than symbol patterns that do not include the first symbol; (section II pages 405-407, figures 2 and 5b. The BPSK signal disclosed by Sumasu is one of an in-phase and

a quadrature component signal) and a demapping and demodulating section that demaps the multi-carrier signal received at the receiving section, demodulates demapped symbol patterns and obtains received data (section II pages 405-407, figures 2 and 5b);

Regarding claim 61, Sumasu discloses a mapping section that maps transmission data to subcarriers with a first symbol string, the first symbol string being selected from symbol patterns that include a first symbol with an amplitude of at least one of an in-phase component and a quadrature component set to "0" and have a greater number of patterns than symbol patterns that do not include the first symbol (section II pages 405-407, figures 2 and 5a. The BPSK signal disclosed by Sumasu is one of an in-phase and a quadrature component signal); and a transmitting section that transmits mapped multi-carrier signals (section II pages 405-407, figures 2 and 5b);

Regarding claim 62, Sumasu discloses a mapping section that maps transmission data to subcarriers with a first symbol string, the first symbol string being selected from symbol patterns that include a first symbol with an amplitude of at least one of an in-phase component and a quadrature component set to "0" and have a greater number of patterns than symbol patterns that do not include the first symbol (section II pages 405-407, figures 2 and 5a. The BPSK signal disclosed by Sumasu is one of an in-phase and a quadrature component signal), and a transmitting section that transmits mapped multi-carrier signals (section II pages 405-407, figures 2 and 5a).

Regarding claim 63, Sumasu discloses mapping transmission data to subcarriers with a first symbol string on a transmitting apparatus side, the first symbol string being

selected from symbol patterns that include a first symbol with an amplitude of at least one of an in-phase component and a quadrature component set to "0" and have a greater number of patterns than symbol patterns that do not include the first symbol (section II pages 405-407, figures 2 and 5a. The BPSK signal disclosed by Sumasu is one of an in-phase and a quadrature component signal); and transmitting the mapped multi-carrier signal (section II pages 405-407, figures 2 and 5a), receiving the multi-carrier signal mapped to the subcarriers with the first symbol string including the first symbol on a receiving apparatus side (section II pages 405-407, figures 2 and 5b), and demapping the multi-carrier signal, demodulating demapped symbol pattern, and obtaining reception data (section II pages 405-407, figures 2 and 5b).

Regarding claim 2, Sumasu discloses claim 57, Sumasu also discloses demapping a multi-carrier signal mapped to subcarriers with a first symbol string including a first symbol to a second symbol string excluding the first symbol in predetermined symbol units and demodulates the demapped symbol pattern to obtain reception data (section II pages 405-407, figures 2 and 5b).

Regarding claim 3, Sumasu discloses claim 57, Sumasu also discloses demodulating a multi-carrier signal mapped to subcarriers with a first symbol string including a first symbol and converts the demodulated first data expressed with three discrete values to second data expressed with two discrete values (section II pages 405-407, figures 2 and 5b).

Regarding claim 4, Sumasu discloses claim 2, Sumasu also discloses storing a table of correspondence between a first symbol string and a second symbol string and

collating for checking a received symbol string against the table (section II pages 405-407, figures 2 and 5b).

Regarding claim 5, Sumasu discloses claim 3, Sumasu also discloses a table of correspondence between a second data pattern expressed with two discrete values and a first data pattern expressed with three discrete values (section II pages 405-407, figures 2 and 5b).

Regarding claim 8, Sumasu discloses claim 57, Sumasu also discloses measuring the amplitude of a symbol mapped to each subcarrier and pattern deciding for deciding the first symbol string based on the measured amplitude (section II pages 405-407, figures 2 and 5b).

Regarding claim 9, Sumasu discloses claim 57, Sumasu also discloses deciding a subcarrier to which a first symbol is mapped according to the number of subcarriers to which the first symbol with amplitude "0" is mapped and deciding symbols other than the symbol in the symbol string decided to be the first symbol through a polarity decision (section II pages 405-407, figures 2 and 5b).

Regarding claim 10, Sumasu discloses claim 57, Sumasu also discloses demapping by associating a plurality of first symbol strings with one data pattern in predetermined symbol units (section II pages 405-407, figures 2 and 5b).

Regarding claim 11, Sumasu discloses claim 57, Sumasu also discloses combining a plurality of symbols as a combined symbol, first deciding a symbol having the smallest amplitude value of the combined symbol as a first symbol and second

making a polarity decision on symbols other than the first symbol (section II pages 405-407, figures 2 and 5b).

Regarding claim 12, Sumasu discloses claim 11, Sumasu also discloses combining a plurality of symbols (section II pages 405-407, figures 2 and 5b).

Regarding claim 13, Sumasu discloses claim 11, Sumasu also discloses combining a plurality of symbols with an equal gain (section II pages 405-407, figures 2 and 5b).

Regarding claim 14, Sumasu discloses claim 11, Sumasu also discloses combining a plurality of symbols with a maximum ratio (section II pages 405-407, figures 2 and 5b).

Regarding claim 17, Sumasu discloses claim 58, Sumasu also discloses mapping the second symbol string obtained by modulating data to be sent to subcarriers with the first symbol string including the first symbol (section II pages 405-407, figures 2 and 5a).

Regarding claim 18, Sumasu discloses claim 58, Sumasu also discloses convert second data expressed with two discrete values to be sent to first data expressed with three discrete values and modulates the first data to the first symbol string including the first symbol (section II pages 405-407, figures 2 and 5a).

Regarding claim 19, Sumasu discloses claim 17, Sumasu also discloses the storing a table of correspondence between the first symbol string and second symbol string (section II pages 405-407, figures 2 and 5a).

Regarding claim 20, Sumasu discloses claim 18, Sumasu also discloses storing a table of correspondence between a second data pattern expressed with two discrete values and a first data pattern expressed with three discrete values (section II pages 405-407, figures 2 and 5a).

Regarding claim 21, Sumasu discloses claim 58, Sumasu also discloses fixing the number of subcarriers to which the first symbol is mapped (section II pages 405-407, figures 2 and 5a).

Regarding claim 22, Sumasu discloses claim 58, Sumasu also discloses notifying the number of subcarriers to which the first symbol is mapped (section II pages 405-407, figures 2 and 5a).

Regarding claim 23, Sumasu discloses claim 58, Sumasu also discloses that the Euclidean distance between a first symbol string and another first symbol string mapped is equal to or greater than a predetermined distance (section II pages 405-407, figures 2 and 5a. The distance from –1 to 1 is greater than from 1 to "0").

Regarding claim 24, Sumasu discloses claim 58, Sumasu also discloses that the first symbol string group and another first symbol string group mapped by the mapping have different positions of subcarriers to which the first symbol is mapped (section II pages 405-407, figures 2 and 5a).

Regarding claim 25, Sumasu discloses claim 58, Sumasu also discloses that the mapping associates one data pattern with a plurality of first symbol strings and sends any one of the plurality of first symbol strings (section II pages 405-407, figures 2 and 5a).

Regarding claim 26, Sumasu discloses claim 25, Sumasu also discloses that the Euclidean distance between a first symbol string corresponding to one data piece to be sent and another first symbol string corresponding to the data to be sent mapped by the mapping is equal to or smaller than the Euclidean distance from the other first symbol string (section II pages 405-407, figures 2 and 5a. The distance from –1 to 1 is greater than from 1 to "0").

Regarding claim 27, Sumasu discloses claim 58, Sumasu also discloses that the first symbol on a subcarrier is different from the one on which the first symbol was placed in the past in the first symbol string to be sent (section II pages 405-407, figures 2 and 5a).

Regarding claim 28, Sumasu discloses claim 27, Sumasu also discloses storing the position and timing of the first symbol in the first symbol string (section II pages 405-407, figures 2 and 5a).

Regarding claim 30, Sumasu discloses claim 58, Sumasu also discloses using a set of a plurality of first symbols for the first symbol and maps from the data pattern to the first symbol string (section II pages 405-407, figures 2 and 5a).

Regarding claim 50, Sumasu discloses claim 63, Sumasu also discloses that the second symbol string obtained by modulating data to be sent is mapped to subcarriers with the first symbol string including the first symbol (section II pages 405-407, figures 2 and 5a).

Regarding claim 51, Sumasu discloses claim 63, Sumasu also discloses that the second data expressed with two discrete values to be sent is converted to first data

expressed with three discrete values and the first data is modulated to a first symbol string including the first symbol (section II pages 405-407, figures 2 and 5a).

Regarding claim 52, Sumasu discloses claim 63, Sumasu also discloses a multi-carrier signal mapped to subcarriers with the first symbol string including the first symbol is demapped to a second symbol string excluding the first symbol in predetermined symbol units and the demapped symbol pattern is demodulated to obtain reception data (section II pages 405-407, figures 2 and 5b).

Regarding claim 53, Sumasu discloses claim 63, Sumasu also discloses that a multi-carrier signal mapped to subcarriers with the first symbol string including the first symbol is demodulated and the demodulated first data expressed with three discrete values is converted to second data expressed with two discrete values (section II pages 405-407, figures 2 and 5b).

Regarding claim 54, Sumasu discloses claim 63, Sumasu also discloses measuring the amplitude of a symbol mapped to each subcarrier and deciding the first symbol string based on the measured amplitude (section II pages 405-407, figures 2, 5a and 5b).

Regarding claim 55, Sumasu discloses claim 63, Sumasu also discloses notifying the number of subcarriers to which a first symbol with amplitude "0" is mapped (section II pages 405-407, figures 2, 5a and 5b), and deciding a subcarrier to which the first symbol is mapped according to the number of subcarriers to which the first symbol with amplitude "0" is mapped (section II pages 405-407, figures 2, 5a and 5b); and deciding

polarity about symbols other than the first symbol (section II pages 405-407, figures 2, 5a and 5b).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sumasu as applied to claim 4 above, and further in view of O'Sullivan (US 5487069 A).

Regarding claim 6, Sumasu discloses claim 4, Sumasu doesn't disclose retransmission requesting for requesting the transmitting side for retransmission when the received symbol string cannot be associated with any patterns in the table. O'Sullivan discloses retransmission requesting for requesting the transmitting side for retransmission when the received symbol string cannot be associated with any patterns in the table (column 8 lines 27-36; and column 10 lines 35-46). Sumasu and O'Sullivan are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the retransmission technique disclosed by O'Sullivan. The suggestion/motivation for doing so would have been to improve the transmission performance (O'Sullivan column 10 lines 35-46).

Regarding claim 7, Sumasu discloses claim 4, Sumasu doesn't disclose error correcting for correcting errors of a received symbol string when the symbol string cannot be associated with any patterns in the table. O'Sullivan discloses error correcting for correcting errors of a received symbol string when the symbol string cannot be associated with any patterns in the table (column 6 lines 54-67). Sumasu and O'Sullivan are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the retransmission technique disclosed by O'Sullivan. The suggestion/motivation for doing so would have been to improve the transmission performance (O'Sullivan column 10 lines 35-46).

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sumasu as applied to claim 27 above, and further in view of Garcia (US 6785258 B1).

Regarding claim 29, Sumasu discloses claim 27, Sumasu doesn't disclose a random number generating for determining the position and timing of the first symbol in the first symbol string according to random numbers. Garcia discloses a random number generating for determining the position and timing of the first symbol in the first symbol string according to random numbers (abstract figure 1 block 16, column 4 lines 43-56). Sumasu and Garcia are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the randomization technique disclosed by Garcia. The

suggestion/motivation for doing so would have been to reduce the peak power of the signal (Garcia abstract).

Claims 31-39, 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sumasu as applied to claims 31 and 35 above, and further in view of Sumiya (US 5319672 A).

Regarding claim 31, Sumasu discloses claim 58, Sumasu doesn't disclose a first spreading section that spreads a symbol string at a predetermined spreading rate. Sumiya discloses a first spreading section that spreads a symbol string at a predetermined spreading rate (figure 6A and 7 column 7 lines 7-26). Sumasu and Sumiya are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the transmission technique disclosed by Sumiya. The suggestion/motivation for doing so would have been to communicate with a plurality the receivers at the same time (Sumiya abstract).

Regarding claim 32, Sumasu and Sumiya disclose claim 31, Sumiya also discloses spreading at a predetermined spreading rate (figure 6A and 7 column 7 lines 7-26). Sumasu and Sumiya are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the transmission technique disclosed by Sumiya. The

suggestion/motivation for doing so would have been to communicate with a plurality the receivers at the same time (Sumiya abstract).

Regarding claim 33, Sumasu and Sumiya disclose claim 31, Sumasu also discloses and mapping the second symbol string to subcarriers with the first symbol string including the first symbol (section II pages 405-407, figures 2 and 5a). Sumiya also discloses spreading at a predetermined spreading rate. Sumiya discloses spreading at a predetermined spreading rate (figure 6A and 7 column 7 lines 7-26). Sumasu and Sumiya are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the transmission technique disclosed by Sumiya. The suggestion/motivation for doing so would have been to communicate with a plurality the receivers at the same time (Sumiya abstract).

Regarding claim 34, Sumasu and Sumiya disclose claim 32, Sumasu also discloses serial-parallel converting for converting from serial to parallel the first symbol string (section II pages 405-407, figures 2 and 5a). Sumiya also discloses spreading at a predetermined spreading rate (figure 6A and 7 column 7 lines 7-26). Sumasu and Sumiya are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the transmission technique disclosed by Sumiya. The suggestion/motivation for doing so

would have been to communicate with a plurality the receivers at the same time (Sumiya abstract).

Regarding claim 35, Sumasu and Sumiya disclose claim 31, Sumasu also discloses serial-parallel convert for converting from serial to parallel the first symbol string (section II pages 405-407, figures 2 and 5a). Sumiya discloses spreading at a predetermined spreading rate (figure 6A and 7 column 7 lines 7-26). Sumasu and Sumiya are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the transmission technique disclosed by Sumiya. The suggestion/motivation for doing so would have been to communicate with a plurality the receivers at the same time (Sumiya abstract).

Regarding claim 36, Sumasu and Sumiya disclose claim 35, Sumasu also discloses that serial-parallel converter converts from serial to parallel the first symbol string including the first symbol mapped by the mapping (section II pages 405-407, figures 2 and 5a).

Regarding claim 37, Sumasu and Sumiya disclose claim 35, Sumasu also discloses mapping the symbol stream (section II pages 405-407, figures 2 and 5a).

Regarding claim 38, Sumasu and Sumiya disclose claim 35, Sumasu also discloses that serial-parallel converter converts from serial to parallel the first symbol string including the first symbol mapped by the mapping (section II pages 405-407, figures 2 and 5a), Sumiya also discloses second spreading for spreading the first

symbol string including the first symbol mapped by the mapping at a predetermined spreading code (figure 6A and 7 column 7 lines 7-26). Sumasu and Sumiya are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the transmission technique disclosed by Sumiya. The suggestion/motivation for doing so would have been to communicate with a plurality the receivers at the same time (Sumiya abstract).

Regarding claim 39, Sumasu and Sumiya disclose claim 35, Sumasu also discloses that serial-parallel converter converts from serial to parallel the first symbol string including the first symbol mapped by the mapping (section II pages 405-407, figures 2 and 5a), Sumiya also discloses second spreading spreading the second symbol string at a predetermined spreading rate (figure 5A block 3_2 column 6 lines 50-60). Sumasu and Sumiya are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the transmission technique disclosed by Sumiya. The suggestion/motivation for doing so would have been to communicate with a plurality the receivers at the same time (Sumiya abstract).

Regarding claim 41, Sumasu and Sumiya disclose claim 31, Sumiya also discloses a second spreading for spreading the signal spread by the first spreading using spreading codes which differ from one communication apparatus to another at a

predetermined spreading rate (figure 5A block 3_3 column 6 lines 50-60). Sumasu and Sumiya are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu the transmission technique disclosed by Sumiya. The suggestion/motivation for doing so would have been to communicate with a plurality the receivers at the same time (Sumiya abstract).

Claims 40 and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sumasu and Sumiya as applied to claim 38 above, and further in view of Kaiser (US 6188717 B1).

Regarding claim 40, Sumasu and Sumiya disclose claim 38, Sumasu and Sumiya don't disclose two-dimensional interleaver performing chip-by-chip rearrangement on a spread signal in order of subcarriers and in order of transmission times. Kaiser discloses two-dimensional interleaver performing chip-by-chip rearrangement on a spread signal in order of subcarriers and in order of transmission times (figure 2 block 5, column 5 line 58 to column 6 line 10). Sumasu, Sumiya and Kaiser are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu and Sumiya the interleaver disclosed by Kaiser. The suggestion/motivation for doing so would have been to avoid large error bursts through time selective fading and frequency-selective fading (Kaiser column 5 lines 58-65).

Regarding claim 42, Sumasu, Sumiya and Kaiser disclose claim 41, Kaiser also discloses interleaving performing chip-by-chip rearrangement on the signal spread (figure 2 block 5, column 5 line 58 to column 6 line 10). Sumasu, Sumiya and Kaiser are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu and Sumiya the interleaver disclosed by Kaiser. The suggestion/motivation for doing so would have been to avoid large error bursts through time selective fading and frequency-selective fading (Kaiser column 5 lines 58-65).

Regarding claim 43, Sumasu and Sumiya disclose claim 31, Sumasu and Sumiya don't disclose interleaving performing chip-by-chip rearrangement on the signal spread by the spreading. Kaiser discloses interleaving for performing chip-by-chip rearrangement on the signal spread by the spreading (figure 2 block 5, column 5 line 58 to column 6 line 10). Sumasu, Sumiya and Kaiser are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu and Sumiya the interleaver disclosed by Kaiser. The suggestion/motivation for doing so would have been to avoid large error bursts through time selective fading and frequency-selective fading (Kaiser column 5 lines 58-65).

Regarding claim 44, Sumasu, Sumiya and Kaiser disclose claim 43, Sumiya also discloses second spreading the signal rearranged chip by chip by the interleaving using

codes which differ from one communication apparatus to another at a predetermined spreading rate (figure 5A block 3_3 column 6 lines 50-60). Sumasu, Kaiser and Sumiya are analogous art because they are from the same field of endeavor of multicarrier communications. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Sumasu and Kaiser the transmission technique disclosed by Sumiya. The suggestion/motivation for doing so would have been to communicate with a plurality the receivers at the same time (Sumiya abstract).

Allowable Subject Matter

Claims 15 and 56 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is 571-272-3119. The examiner can normally be reached on 8-6 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Juan Alberto Torres
05-14-2007

TEMESGHEN GHEBRETINSAE
PRIMARY EXAMINER